139

Haemodialysis: effects of acute decrease in preload on tissue Doppler imaging indices of systolic and diastolic function of the left and right ventricles

Abdenasser Drighil (1), Ilham Touhami (2), Sara Hajib (3), Fatima Zahra Labbi (4), Ahmed Bennis (4)
(1) CHU IBN ROCHD, Casablanca, Maroc – (2) CHU IBN ROCHD, cardiologie, Casablanca, Maroc – (3) CHU IBN ROCHD, Cardiologie, Casablanca, Maroc – (4) CHU Ibn Rochd, Cardiologie, Casablanca, Maroc

Aims: Conventional echocardiographic parameters of LV and RV systolic and diastolic function have been shown to be load-dependent. The impact of preload reduction on tissue Doppler parameters of LV and RV function is incompletely understood. The aim of this study was to examine the effect of acute preload reduction by haemodialysis on conventional and TDI indices of systolic and diastolic function of the LV and RV.

Methods and results: 17 uremic patients (age 31+10 years), without overt heart disease underwent conventional 2D and Doppler ECHO together with measurement of longitudinal mitral and tricuspid annular motion velocities. Haemodialysis led to reduction in LV end-diastolic volume (P,0.0001), end-systolic volume (P, 0.001), peak early (E wave) transmitral flow velocity (P 1/4 0.0001), and the ratio of early to late Doppler velocities of diastolic mitral inflow (P 1/4 0.021).For the LV, early diastolic (E0) TDI velocities and the ratio of early to late TDI diastolic velocities (E0/A0) only on the septal side of the mitral annulus decreased significantly after HD (P 1/4 0.0001and P 1/4 0.009, respectively). In a subgroup of 7 patients who sustained significantly larger fluid volume loses following HD, E0 and the ratio of E0/A0 at the lateral side of mitral annulus also decreased suggesting a greater resistance of the lateral annulus to preload changes. Systolic velocities decreased after HD on both sides of mitral annulus (septal P 1/4 0.006; lateral, P 1/4 0.011). For the RV, systolic tricuspid annular velocities decreased (P 1/4 0.002) together with early diastolic velocities after HD (P 1/4 0.0001). Both systolic and early diastolic tricuspid annular velocities correlated directly with fluid removal (P,0.01).

Conclusion: This study shows that both systolic and diastolic TDI velocities of the LV and RV are preload dependent.The lateral mitral annulus is more resistant to preload changes than either the septal mitral annulus or the lateral tricuspid annulus.

140

The effects of growth hormone excess on cardiac structure and function and carotid wall in patients with controlled versus active acromegaly

Ruxandra Jurcut (1), Aurora Vladaia (1), Simona Galoiu (2), Ionela Baciu (2), Oana Savu (1), Mariana Purice (2), Mihail Coculescu (2), Carmen Ginghina (1)
(1) Institut de Maladies Cardiovasculaires, Cardiologie, Bucarest, Roumanie – (2) Institute of Endocrinology "C.I.Parhon", Bucarest, Roumanie

Acromegaly (ACM) is associated with increased cardiovascular (CV) morbidity and mortality, both through direct CV effects of growth hormone (GH) and IGF-1, and associated factors like hypertension (HTA) and diabetes (DM). We have studied the effects of ACM features on cardiac and vascular changes.

Material and methods: 33 pts with ACM (mean age 44±7y, 21 women) underwent evaluation of clinical, biologic (including basal or provoked serum GH, IGF1), echocardiography and carotid arteries echocardiography. An age- and sex-matched group of normal individuals was selected.

Results: Three pts were newly diagnosed, 30 treated by surgery, irradiation, or somatostatin analogues. Associated CV risk factors were: DM 12/33 pts, HTA 10/33 pts, smoking 5/33 pts. Pts were divided in 2 groups: group 1 -active ACM (n=24) and group 2 -controlled ACM (n=9). There were no differences between the 2 groups regarding age, estimated ACM duration and CV risk factors prevalence.

Left ventricular (LV) dimensions were increased in ACM patients compared to controls. In ACM pts, LV volumes were correlated to GH levels and ACM duration (p=0.01). In men with active ACM, LV mass index was significantly higher (161.1±13.2g/m^2) then in controlled ACM (136.6±4.2g/m^2, p=0.01). LV systolic dysfunction (LVEF<50%) was present in 5 pts (4 in group1, 1 in group 2, NS), with a significantly longer disease duration than pts with normal LVEF (18±10.3 vs 10.3±6.2y,p=0.03). Diastolic dysfunction was present in 8 pts in group 1, vs no pts in group 2 (p=0.04). Carotid artery diameter was increased in ACM vs controls. Carotid IMT was dependent on age, DM, HTA and ACM duration (p=0.01), without significant differences between the 2 groups.

Conclusions: ACM is associated with both cardiac and arterial structural changes vs controls. LV hypertrophy and diastolic dysfunction were more prevalent in pts with active than controlled ACM, while systolic function and early atherosclerosis were influenced by ACM duration.

141

Usefulness of tricuspid annular displacement (TAD) to identify right ventricular dysfunction in normotensive patients with acute pulmonary embolism

Thomas Hugues, Khelil Yaici, S Bun, D Latcu, Jean Paul Rinaldi, Naima Zarqane, Philippe Ricard, Nadir Saoudi
CH Princesse Grace, Cardiologie, Monaco, Monaco

Echocardiographic criteria of right ventricular dysfunction (RVD) in acute pulmonary embolism (PE) differ among published studies. Assessment of RV systolic function remains difficult because of the RV's complex shape.

We aimed to evaluate RV systolic function with TAD in patients (pts) with acute PE. TAD (QLAB, Philips Medical Imaging) was based on a tissue tracking algorithm that is ultrasound beam angle independent for automated detection of tricuspid annular displacement.

Methods: All adults pts who were diagnosed with PE from december 2008 to march 2009 at Princesse Grace Hospital, Monaco were eligible for this study after exclusion of history of heart failure.

We evaluated 22 consecutive pts with PE (12 male, mean age 62,2 years) which underwent echocardiography, plasma BNP titration during the first day after admission, and a second echocardiography obtained within 48 hours before discharge.

Results: TAD showed significant positive correlation with RV FAC (R^2= 0,49; p= 0,0003) and Sa (R^2= 0,43 ; p= 0,001).

Among pts with PE who presented signs of RVD, TAD value was 12.5 +/–5.4 mm vs 15.9 +/–2.7mm (p=0.05). TAD value was 17 +/– 4.2mm when BNP level was less than 80 pg/mL vs 11.1 +/– 3.7 (p= 0.007) among pts who had BNP level > 80 pg/mL. After treatment, follow-up echocardiographic data were obtained from 21 pts (mean: 8.8+/-3.6 days). Mean pulmonic valve acceleration time, Sa and TAD were significantly improved (p<0.05). There was no difference between TAD among pts with echocardiographic RVD at baseline vs pts without RVD (15 +/– 4.2 vs 16.4 +/– 3mm; p=0.3). Three pts who deteriorated during short-term observation had substantially lower TAD values than those with uncomplicated courses (6.5 +/– 1.2mm vs 14.9 +/–4.1mm; p= 0.006).

In conclusion, impaired TAD was associated with decreased RV systolic function in pts with acute PE. To identify the clinical meaning of decreased TAD, larger trials with longer follow-up periods are needed.

142

A new image processing (4DLVQ) for 3D echocardiographic LV volumes quantification

Laurent Macron (1), Julien Nahum (1), Alexandre Bensaid (1), Laurens Mitchell-Heggs (1), Leslie Deal (1), Jean-François Deux (2), Pascal Guéret (1), Pascal Lim (1)
(1) hopital henri mondor, cardiologie, Créteil, France – (2) hopital henri mondor, radiologie, Créteil, France

Objective: To validate a new 3D semi automatic images processing (4DLVQ) that provides a fast and accurate assessment of LV volumes.

Method: LV end-diastolic (LVEDV), end-systolic volumes (LVESV) and ejection fraction (LVEF) were computed using 4DLVQ software in 55 patients (57±17 years) and compared to MRI measurements.

Results: Time required for LV volumes analysis by 4DLVQ averaged 147s. A close correlation was observed between MRI and 4DLVQ for LVEDV(mean=169±83mL, r^2=0.89, p<0.001), LVESV (mean=98±81mL, r^2=0.95, p<0.001) and LVEF (mean=47±16%, r^2=0.8, p<0.001). In addition, Bland-Altman analysis showed a good agreement for LVEDV (SD=29mL), LVESV (SD=24mL) and LVEF (SD=7%) between 4DLVQ and MRI. Inter-observer for LV volumes and LVEF were 10% and 8% respectively.

Conclusion: 4DLVQ available online provides an accurate and fast measurement of LV volumes and EF and may contribute to extend the clinical use of 3D echocardiography in daily practice.

143

Echocardiographic assessment of cardiac remodeling in the high-level football player

Kawtar Bennis, Fatima Azzahra Labbi, Mohamed Bennani, Ilham Touhami, Ahmed Bennis
CHU Ibn Rochd, Cardiologie, Casablanca, Maroc

Introduction: The aim of this study is to assess the morphological and hemodynamic cardiovascular changes of 24 high-level football players, using Doppler-echocar-diography, and compare them to a similar control group.

Methods and results: Twenty-four elite football players were matched to 24 normal subjects according to age, sex, and body surface. All participants had a clinical examination, resting ECG, Doppler-echocardiography and a measurement of maximal oxygen uptake (VO 2 max). The echocardiographic variables were compared between two groups by the Student's t-test and other statistical tests, using the SPSS 12 for Windows software. Compared to the control group, the wall thickness (10.49+1.04 vs. 7.5+2.04 mm, p<0.05), the LV end-diastolic diameter (57.1+3.70 vs. 41.2+3.65 mm, p<0.01) and left atrium surface (20.16+2.03 vs. 16.16+1.83 cm 2, p<0.01) were significantly more important in football players. The LV and RV ejection fractions were similar in both groups. The RV long-axis diastolic diameter (8+0.5 vs. 6.5+1.1 mm, p<0.01) and S-wave using DTI (0.17+0.02 vs. 0.14+0.02, p<0.05) were more important among football players.

Conclusion: This study on the cardiac remodeling in high-level athletes permits to have a distinctive approach between physiological and pathological remodeling. This remodeling varies according to the player's post and exercise capacities. In a football player, a correlation between physical level and physical capacity is plausible.

144

Real-time three-dimensional echocardiography assessment of left ventricular function: left ventricular volumes underestimation increase with the dilatation degree

Pamela Moceri, David Bertora, Jean-Pierre Camous, Pierre Gibelin
CHU Nice – Hopital Pasteur, Cardiologie, Nice, France

Aims: Accurate quantification of left ventricular (LV) volumes and ejection fraction (EF) is important, especially in heart failure patients. Cardiac magnetic resonance imaging (MRI) is considered as the reference and then we sought to compare three-dimensional echocardiography (3DE) for LV volumes and EF estimation, relative to MRI in heart failure patients.

Methods: We studied 24 patients (17 men, age 58 ± 15 years) with history of heart failure who underwent 3DE (Full volume real-time 3DE – iE33 (Philips Medical system) QLAB workstation) and MRI in a 48-hour delay. No patient was excluded from the study due to poor image quality.

Results/Discussion: The heart failure etiology was: 41,7% (n=10) ischemic cardiomyopathy, 50% (n=12) dilated idiopathic cardiomyopathy and 8,3% (n=2) of patients suffered from heart failure with preserved EF. Mean LV end-diastolic volume (LVEDV) evaluated by MRI was 208 ± 108mL (121 ± 64 mL/m^2), mean EF 31 ± 13% and mean LV end-systolic volume (LVESV) was 149 ± 97 mL. 3DE data sets highly correlated with MRI, especially concerning EF (r : 0.86, 0.88, and 0.96 for LVEDV, LVESV, and EF, respectively) with small biases (-55 mL, -44 mL, 1,1%) and acceptable limits of agreement, but LV volumes are significantly underestimated by 3DE particularly in our patients with severe LV dysfunction, and 3DE data sets do not correlate as well as expected. We then determined that with a LVEDV below 120 mL/m^2, 3D was more accurate for volumes and EF evaluation. The degree of underestimation of LV volumes is significatively correlated with the LV dilatation degree (r = 0,60 p=0,01).

Conclusion: Compared with MRI, 3DE is a good method to evaluate LVEF, but 3DE appears to underestimate significantly LV volumes, with the problem of foreshortened apical views in heart failure patients. As the LVEDV increase, 3D accuracy simultaneously decrease.

145

Right ventricular function assessment in PAH patients: a two-dimensional strain and three-dimensional echocardiographic study

Yves Huerre (1), Thien Tri Cung (1), Antoine Micheau (2), Frederic Cransac (1), Hélène Vernhet (2), Arnaud Bourdin (3), Jean Marc Davy (1), Christophe Piot (1), Catherine Sportouch-Dukhan (1)
(1) CHU ARNAUD DE VILLENEUVE Montpellier, Département de cardiologie, Montpellier, France – (2) CHU ARNAUD DE VILLENEUVE, RADIOLOGIE, Montpellier, France – (3) CHU ARNAUD DE VILLENEUVE, PNEUMOLOGIE, Montpellier, France

Background: Right ventricular (RV) function has major prognostic implications for pulmonary arterial hypertension (PAH). RV function assessment by echocardiography is challenging in PAH patients. New techniques such as two-dimensional strain (2DS) and three dimension (3D) echocardiography may allow assessment of RV function.

Objective: We sought to determine among echocardiographic techniques – those widely used, 2DS and 3D – which one was the best correlated to magnetic resonance imaging (MRI) measurements.

Methods: Fourteen patients with PAH (mean age 58 +/- 17 yr, 7 women) were evaluated. RV fractional area change (RVFAC), Tei index, peak systolic velocity (S), Tricuspid Annular Plane Systolic Excursion (TAPSE) were measured. Global and segmental RV longitudinal deformations were recorded by 2DS echocardiography from 4 apical-chamber views using 6 segments RV model. Echocardiographic system designed for 3D was Tomtec.

Results: TAPSE, peak S and RVFAC were lower in PAH patients than control and correlated to MRI ($p < 0.005$). Global and free wall strain measured by 2DS and ejection fraction VD (FEVD) by MRI ($r = 0.73$; $p< 0.005$) were inversely correlated. The 3D volume and 3D FEVD were strongly correlated to corresponding measurements obtained by MRI (volume: $r = 0.88$; $p < 0.005$) (FE: $r = 0.85$; $p<0.005$).

Conclusion: Both 2DS and 3D echocardiography techniques are strongly correlated to MRI. Simple and reliable 2DS could be preferred to 3D.

146

Right ventricular function in elderly assessed by two-dimensional strain

Fathia Mghaieth (1), Hanane Bougteb (2), Réant Patricia (2), Stéphane Lafitte (2), Raymond Roudaut (2)
(1) Hôpital la Rabta, Cardiologie, Tunis, Tunisie – (2) Hôpital du Haut Levêque, Pessac, France

Background: Two-dimensional strain (2D strain) has shown its usefulness for the assessment of right ventricular function. Normal values in elderly are still unknown and could have a prognostic value.

Objectives: To compare right ventricular (RV) regional and global longitudinal 2D strain (LS) in old healthy people to young healthy subjects and to patients with a pathological RV.

Methods: Old subjects without cardiac disease history were prospectively enrolled in a geriatric department after complete standard echocardiographic

▶